

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A composition of matter including a liquid continuous phase and a liquid discontinuous phase which is substantially immiscible in the continuous phase,
5 characterised by the continuous phase having a high electrical volume resistivity and the discontinuous phase comprising or including a reagent and being electrically charged.
2. A composition of matter as in Claim 1 wherein the reagent is selected from the
10 group comprising a bio-active agent, an activated nucleoside amidite (A, C, G or T), an activated oligonucleotide, a reagent or reactant including an acid or a base, a blocking chemical, a de-blocking chemical, an organic or inorganic derivatisation chemical, a catalyst, a pharmaceutical, a dye or a pigment.
- 15 3. A composition of matter including a liquid continuous phase, a liquid discontinuous phase which is substantially immiscible in the continuous phase and a surfactant, characterised by the continuous phase having a high volume resistivity, the discontinuous phase being electrically charged and the surfactant being selected to not significantly reduce the volume resistivity of the continuous phase.
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4. A composition of matter as in Claim 3 wherein the surfactant has a first part which is compatible with the continuous phase and a second part which is compatible with the discontinuous phase.
- 25 5. A composition of matter as in Claim 3 further including in the discontinuous phase a compound selected from the group comprising a bio-active agent, an activated nucleoside amidite (A, C, G or T), an activated oligonucleotide, a reagent or reactant including an acid or a base, a blocking chemical, a de-blocking chemical, an organic or inorganic derivatisation chemical, a catalyst, a pharmaceutical, a dye or a
30 pigment..

6. An emulsion including a continuous phase, a discontinuous phase which is immiscible in the continuous phase, and a surfactant, the surfactant having a first part which is compatible with the continuous phase and a second part which is compatible with the discontinuous phase, characterised by the continuous phase having a high volume resistivity, the discontinuous phase being electrically charged and the surfactant being selected to not significantly reduce the volume resistivity of the continuous phase.
7. An emulsion as in Claim 6 wherein the continuous phase comprises a liquid which is electrically insulative having a volume resistivity of approximately 1×10^6 ohm-cm or greater.
8. An emulsion as in Claim 6 wherein the continuous phase is selected from the group comprising hydrocarbons including hexane, decalin, cyclohexane, iso-octane, heptane, aromatic hydrocarbons and isodecane and mixtures of hydrocarbons; fluoro-chemicals including fluoro-carbon compounds including linear, cyclic or polycyclic perfluoroalkanes, bis(perfluoroalkyl)alkenes, perfluoroethers, perfluoroalkylamines, perfluoroalkyl bromides and perfluoroalkyl chlorides; silicone fluids including polyphenylmethyl siloxanes, dimethyl polysiloxanes, polydimethyl siloxanes, cyclic dimethyl siloxanes.
9. An emulsion as in Claim 6 wherein the continuous phase is a gel or highly viscous liquid.
10. An emulsion as in Claim 6 wherein the discontinuous phase is non-aqueous and immiscible or substantially insoluble in the continuous phase.
11. An emulsion as in Claim 6 wherein the discontinuous phase is selected from the group comprising a reagent, a solvent which carries an active chemical reagent or a carrier liquid for a solid or insoluble liquid dispersed in the discontinuous phase.

12. An emulsion as in Claim 6 wherein the discontinuous phase of the emulsion is selected from the group comprising acetone, acetonitrile, cyclohexanone, dibromomethane, dichloromethane (methylene chloride, DCM), trichloromethane, dimethyl formamide (DMF), dioxane, 1,2-dichloroethane (DCE), nitromethane, tetrahydrofuran, toluene, decalin, dimethyl formamide, isobutanol, Isopar, Norpar, propylene carbonate, dimethyl sulphoxide or mixtures of compounds such as isopropanol/methylene chloride, nitromethane/methanol, nitromethane/isopropanol, trichloromethane/methanol or isopropanol/methylene chloride.

13. An emulsion as in Claim 6 further including in the discontinuous phase a compound selected from the group comprising a bio-active agent, an activated nucleoside amidite (A, C, G or T), an activated oligonucleotide, a reagent or reactant including an acid or a base, a blocking chemical, a de-blocking chemical, an organic or inorganic derivatisation chemical, a catalyst, a pharmaceutical, a dye or a pigment.

14. An emulsion as in Claim 6 wherein the surfactant is selected to have a first part which is compatible with the continuous phase and a second part which is compatible with the discontinuous phase.

15. An emulsion as in Claim 6 wherein the surfactant is selected from the group comprising anionic, cationic, non-ionic or amphoteric compounds, polymer surfactant materials or phospholipids or fluorinated analogues of these.

16. An emulsion as in Claim 4 further including a charge control agent.

17. An emulsion as in Claim 16 wherein the charge control agent is selected from the group comprising an acid and its salts, an organic acid and its salts or an ionic or zwitterionic compound.

18. An emulsion as in Claim 16 wherein the charge control agent is selected from the group comprising metallic soaps wherein the metal includes: barium, calcium, magnesium, strontium, zinc, cadmium, aluminium, gallium, lead, chromium, manganese, iron, nickel, zirconium and cobalt and the acid portion is provided by a carboxylic acid, e.g., caproic acid, octanoic (caprylic) acid, capric acid, lauric acid, myristic acid, palmitic acid, stearic acid, oleic acid, linolic acid, erucic acid, tallitic acid, resinic acid, naphthenic acid, succinic acid, a phospholipid, or where the continuous phase is a fluoro-chemical the charge control agent includes a fluorine analogue of the compounds listed above.

19. An emulsion as in Claim 4 wherein the continuous phase is present in the range of about 40 to 99.99 per cent by volume, the discontinuous phase is present in a range of from about 0.01 to 60 per cent by volume, optionally a surfactant present in a range of about 0.01 to 20 per cent by weight and a charge control agent present in a range of 0.01 to 10 per cent by weight.

20. An emulsion as in Claim 4 wherein the discontinuous phase has a droplet size of from about 100 microns down to 0.2 microns.

21. An emulsion as in Claim 4 wherein the emulsion is a mini-emulsion with a discontinuous phase having a droplet size from 1000 nanometres down to about 50 nanometres.

22. An emulsion as in Claim 4 wherein the emulsion is a micro-emulsion with a discontinuous phase having a droplet size of from about 200 nanometres down to 1 nanometre.

23. A composition being an emulsion including a continuous phase comprising an insulative liquid, a discontinuous phase comprising a non-aqueous or aqueous solvent and a chemical de-protecting reagent in solution in the non-aqueous or

aqueous solvent and a surfactant, the surfactant having a first part which is compatible with the continuous phase and a second part which includes a group which is compatible with the discontinuous phase, and wherein the continuous phase has a high volume resistivity and the discontinuous phase is electrically charged and the surfactant being selected to not significantly reduce the volume resistivity of the continuous phase.

24. A composition as in Claim 23 wherein the chemical deprotection agent is selected from the group comprising Lewis acids, protonic acids, zinc bromide, titanium tetrachloride, and ceric ammonium nitrate, dilute mineral acids, trichloroacetic acid (TCA), dichloroacetic acid (DCA), benzenesulphonic acid, trifluoroacetic acid (TFA), difluoroacetic acid, perchloric acid, orthophosphoric acid, toluenesulphonic acid, dodecylbenzene sulphonic acid, dinonylnaphthylsulphonic acid (DNNSA), dinonylnaphthylsulphonic acid (DNNSA), perfluorooctanoic acid (PFOA) and diphenyl acid phosphate.

25. A composition as in Claim 23 wherein the continuous phase is a fluorochemical.

26. A composition as in Claim 25 wherein the fluorochemical is a perfluoro-carbon including perfluoro-octane, linear, cyclic or polycyclic perfluoroalkylalkane, bis(perfluoroalkyl)alkene, perfluoroether, perfluoroamine, perfluoroalkyl bromide and perfluoroalkyl.

27. A composition as in Claim 23 wherein the continuous phase is a silicone fluid or an organic liquid.

28. A composition as in Claim 23 wherein the discontinuous phase of the emulsion is selected from the group comprising acetone, acetonitrile, cyclohexanone,

dibromomethane, dichloromethane (methylene chloride, DCM), trichloromethane, dimethyl formamide (DMF), dioxane, 1,2-dichloroethane (DCE), nitromethane, tetrahydrofuran, toluene, decalin, dimethyl formamide, isobutanol, propylene carbonate, dimethyl sulphoxide or mixtures of compounds such as

- 5 isopropanol/methylene chloride, nitromethane/methanol, nitromethane/isopropanol, trichloromethane/methanol or isopropanol/methylene chloride.

29. A composition as in Claim 24 wherein the surfactant is a fluorochemical-
10 hydrocarbon selected from the group comprising perfluorocarbon-propoxypropylene, fluoro-alkyl citrate, perfluoroalkyl-alkylene mono- or dimorpholinophosphate and fluorinated phospholipids, alcohols, polyols or polyhydroxylated or aminated derivatives including amine oxides and amino acid derivatives.

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30. A composition as in Claim 23 wherein the surfactant is a non-ionic, anionic, cationic, amphoteric or zwitterionic surfactant.

31. A composition as in Claim 23 further including a charge control agent.

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32. A composition as in Claim 31 wherein the charge control agent is selected from the group comprising an acid and its salts, an organic acid and its salts or an ionic or zwitterionic compound.

- 25 33. An composition as in Claim 31 wherein the charge control agent is selected from the group comprising metallic soaps wherein the metal includes: barium, calcium, magnesium, strontium, zinc, cadmium, aluminium, gallium, lead, chromium, manganese, iron, nickel, zirconium and cobalt and the acid portion is provided by a carboxylic acid, e.g., caproic acid, octanoic (caprylic) acid, capric acid,
30 lauric acid, myristic acid, palmitic acid, stearic acid, oleic acid, linolic acid, erucic

acid, tallitic acid, resinic acid, naphthenic acid, succinic acid, a phospholipid, or where the continuous phase is a fluoro-chemical the charge control agent may include a fluorine analogue of the compounds listed above.

5 34. An emulsion including a continuous phase, a discontinuous phase which is immiscible in the continuous phase, and a surfactant, the surfactant having a first part which is compatible with the continuous phase and a second part which is compatible with the discontinuous phase, characterised by the continuous phase having a high volume resistivity, the discontinuous phase being electrically charged
10 and including a compound selected from the group comprising a bio-active agent, an activated nucleoside amidite (A, C, G or T), an activated oligonucleotide, a reagent or reactant including acids and bases, a blocking chemical, a de-blocking chemical, an organic or inorganic derivatisation chemical, a catalyst, a pharmaceutical, a dye or a pigment and the surfactant being selected to not significantly reduce the volume
15 resistivity of the continuous phase.

35. An emulsion including a continuous phase and a discontinuous phase which is immiscible in the continuous phase, characterised by the continuous phase having a high volume resistivity, the discontinuous phase being electrically charged and
20 including a compound selected from the group comprising a bio-active agent, an activated nucleoside amidite (A, C, G or T), an activated oligonucleotide, a reagent or reactant including acids and bases, a blocking chemical, a de-blocking chemical, an organic or inorganic derivatisation chemical, a catalyst, a pharmaceutical, a dye or a pigment.
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